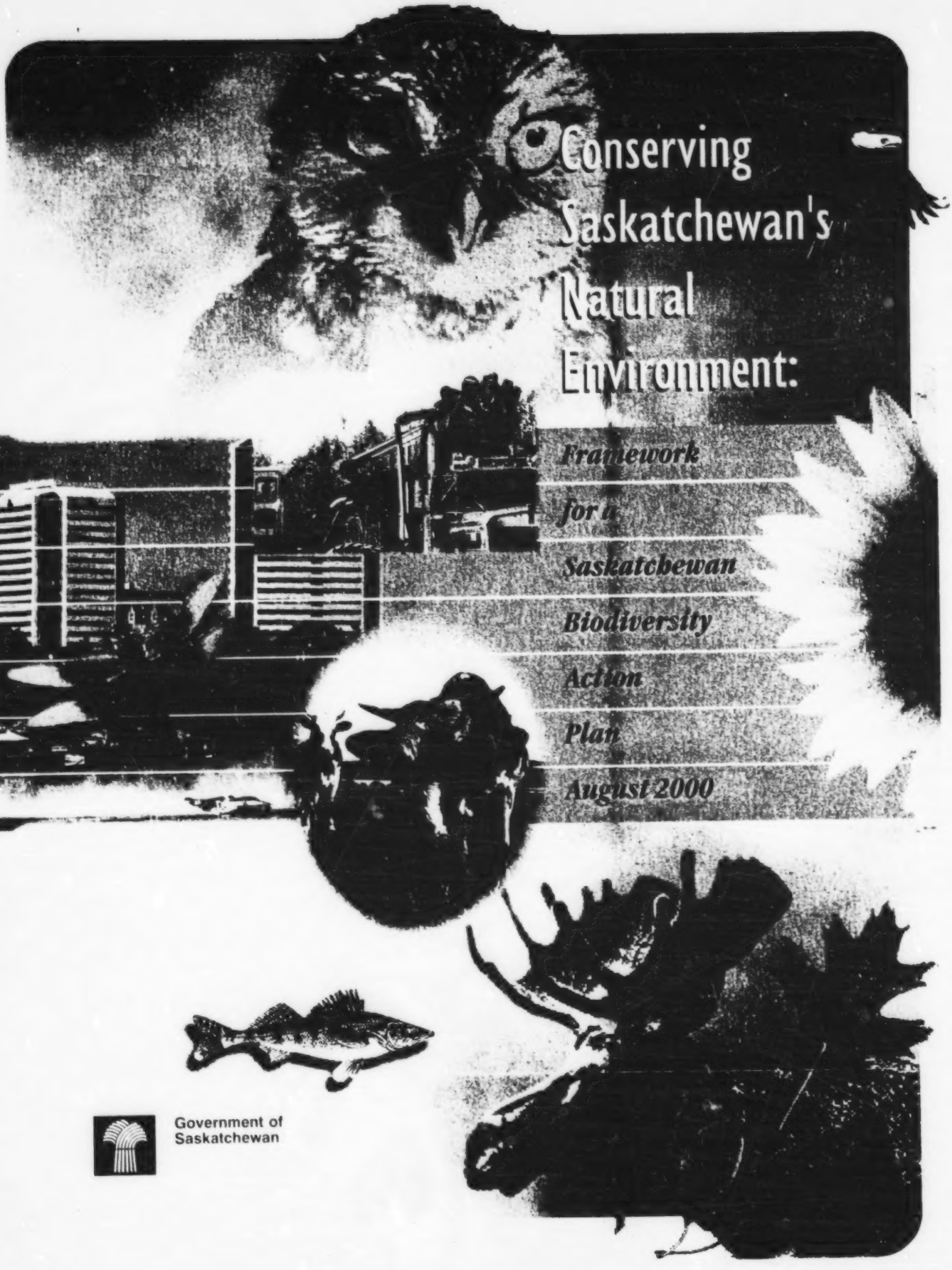


Conserving Saskatchewan's Natural Environment:

Framework for a Saskatchewan Biodiversity Action Plan

August 2000

Government of Saskatchewan

We Value Your Comments:

The following framework is a discussion paper that has been developed to seek public response and includes the following proposals:

- a vision for biodiversity conservation in Saskatchewan;
- statement of principles;
- five goals primarily based on those in the Canadian Biodiversity Strategy; and
- 36 objectives.

The Saskatchewan Biodiversity Interagency Steering Committee would like to receive and consider your comments and suggestions. Input is requested from Saskatchewan residents and organizations with respect to the framework:

- Do you agree with the direction in the discussion paper as outlined in the proposed Vision, Principles and Objectives?
- What biodiversity issues and threats are most important to the province?
- What are the specific government actions you think should be included within a Biodiversity Action Plan for Saskatchewan?
- From your perspective, what are the implications both negative and positive of the 36 proposed objectives?

Your comments are important and can be provided either by completing the enclosed questionnaire, or accessing the website at **http://www.serm.gov.sk.ca/ecosystem** and downloading the questionnaire.

Questionnaires and other comments can be sent directly to:

Saskatchewan Biodiversity
Interagency Steering Committee
c/o Saskatchewan Environment
and Resource Management
Fish and Wildlife Branch
3211 Albert Street , Regina
Saskatchewan S4S 5W6

Email: lin.gallagher.erm@govmail.gov.sk.ca
Fax: (306) 787-9544

Public consultation will occur in two stages. This first stage of the consultation process, dealing with the framework, is available for review by all residents. However, efforts will be targeted towards engaging provincial organizations representing municipalities, special interest groups, Aboriginal peoples, industry, the agricultural community, research organizations and academics. The next stage of consultation will request comments on the draft Action Plan and will be targeted broadly to all Saskatchewan residents.

All comments received will be taken into consideration by the Interagency Steering Committee, leading to the development of the Saskatchewan Biodiversity Action Plan.

Table of Contents:

Acknowledgements ii
Executive Summary 1
Background 2
What is Biodiversity? 3
Maintaining Biodiversity: The Challenge 5
Biodiversity Conservation - What Actions, at What Cost and What Benefits? 7
A Discussion Document to Develop a Saskatchewan Biodiversity Action Plan 9
Proposed Vision Statement 9
Proposed Principles 9
How Can We Protect Biodiversity in Saskatchewan?
Goal One: **Conservation and Sustainable Use** 11
Establish and Manage Protected Areas 11
Sustainable Use of Biological Resources 12
Biodiversity at Risk 13
Climate Change 14
Pesticides and Pollution 14
Harmful Non-Native Organisms and Genetically Modified Organisms 15
Goal Two: **Ecological Management** 17
Information and Research 17
Planning, Decision Making and Environmental Assessment 18
Monitoring 19
Goal Three: **Education and Awareness** 22
Formal Education 22
General Public, Aboriginal Partners and Stakeholder Organizations 22
Information and Technology Transfer 22
Goal Four: **Incentives and Legislation** 24
Policy and Legislation 24
Goal Five: **Inter-jurisdictional Cooperation** 26
External Jurisdictions 26
Internal Jurisdictions 26
International Development Assistance 27
APPENDIX 1: **Glossary of Terms** 29
APPENDIX 2: **Membership List** 30
APPENDIX 3: **References** 31
QUESTIONNAIRE 33

Acknowledgements

Saskatchewan Environment and Resource Management (SERM) extends its appreciation to the many persons who shared their knowledge, ideas and time in the preparation of this Framework for an Action Plan to Conserve Saskatchewan's Biodiversity. In particular we are indebted to the Saskatchewan Biodiversity Interagency Steering Committee representing 11 government departments and agencies and the SERM Biodiversity Working Group who contributed to, edited, reviewed and assisted in the production of this document. To all of you, your assistance and dedication to biodiversity conservation in Saskatchewan is much appreciated.

Saskatchewan Biodiversity Interagency Steering Committee

Chairpersons:

Lin Gallagher, Saskatchewan Environment and Resource Management
John Vandall, Saskatchewan Environment and Resource Management

Current Members:

Peter Gehl, Sask Water
Wayne Gosselin, Saskatchewan Agriculture and Food
Kerry Hanley, SaskEnergy Incorporated
Myrna Knight, Saskatchewan Intergovernmental and Aboriginal Affairs
Giselle Marcotte, Saskatchewan Intergovernmental and Aboriginal Affairs
Glen McMaster, Saskatchewan Wetland Conservation Corporation
George Patterson, Saskatchewan Energy and Mines
Stan Saylor, SaskPower
Cheryl Taylor, Saskatchewan Highways and Transportation
John Wolfenberg, Saskatchewan Municipal Affairs, Culture and Housing
Robin Woodward, Saskatchewan Economic and Co-operative Development

SERM Biodiversity Working Group

Chairpersons:

Lin Gallagher
John Vandall

Members:

Riaz Ahmed
Myron Bilokury
Marlon Killaby
Gigi Pitoello
Rick Stilling
Lawrence Baschak
Kim Clark
Bruce Martin
Randy Seguin

Other Contributors:

Dale Hjertaas, Paul James, and Kevin Murphy

Executive Summary

Saskatchewan has a rich legacy of biodiversity and is steward to a diverse and ecologically significant array of ecosystems. The province's identity is shaped by its landscapes, watersheds and wildlife, the abundance of which underpins our economy and is a source of sustenance, as well as cultural, recreational and spiritual well being.

How biodiversity is managed is not limited to government but requires a coordinated approach based on partnerships with all orders of government, non-government organizations, private sector interests and individuals. A Saskatchewan Biodiversity Action Plan will provide an umbrella for a variety of provincial government actions to achieve long term conservation of biodiversity and sustainable use of biological resources. The plan will be a key building block in efforts to maintain biodiversity and use biological resources sustainably within the province.

This "Conserving Saskatchewan's Natural Environment: Framework for a Saskatchewan Biodiversity Action Plan" discussion document provides the framework: vision, principles, goals and objectives upon which a Saskatchewan Biodiversity Action Plan will be based.

The first element of the framework is a proposed vision statement for Saskatchewan:

We must act with wisdom and prudence today to ensure we leave future generations, a nurturing and dynamic environment rich in its biodiversity.

In support of this vision, the framework also presents a series of principles that will guide development of the final Action Plan. The framework is structured around five goals, based closely on the Canadian Biodiversity Strategy. These five goals are:

- to conserve biodiversity and use biological resources in a sustainable manner;
- to improve our understanding of ecosystems and increase our resource management capability;
- to promote an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner;
- to maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources; and
- to cooperate with other jurisdictions (international, national, provincial, municipal and First Nations) having policy responsibility and/or program interests to conserve biodiversity and use biological resources in a sustainable manner.

Finally, the discussion document introduces 36 objective statements and suggested areas for actions which provide a starting point for identifying specific actions for inclusion within the Saskatchewan Biodiversity Action Plan.

Collectively these objective statements change the way we value and manage landscapes to foster sustainability. Whatever actions are proposed in support of each objective will have to be carefully assessed for not only their environmental implications, but also economic and social implications. It is important that we as a society determine what is required to conserve and sustainably use biological resources, what actions we are willing to endorse and what are the acceptable costs of those actions.

Conserving Saskatchewan's Natural Environment: Framework for a Saskatchewan Biodiversity Action Plan

A discussion paper for planning the Saskatchewan Government's activity in biodiversity conservation

The Government of Saskatchewan is developing a Biodiversity Action Plan to conserve our province's biodiversity for present and future generations. A key component in the development of the Action Plan will be to consider public views and concerns about what should be the government's role in biodiversity conservation over the next five years. This discussion paper will provide the framework upon which the Action Plan will be based. Included are proposed vision, principles, goals, objectives and suggested areas for action. Public feedback on this document will assist in finalizing a framework and in the development of a draft Action Plan for public comment. Please review this discussion paper and provide your comments.

Background

The five goals of Saskatchewan's Environmental Agenda, prepared by the Saskatchewan Government in 1994, along with associated actions were designed "to achieve a sustainable environmental future for Saskatchewan". The five goals include:

- protect primary resources of air, water, and soil;
- preserve biodiversity and ensure the sustainable use of renewable resources and ecosystems;
- use non-renewable resources wisely;
- meet our national and global responsibilities; and
- develop a sustainable society.

The Biodiversity Action Plan will focus on the second goal: "to preserve biodiversity" and specifically what should be the role of the Saskatchewan Government.

Responsibility for biodiversity lies with all sectors of society, with the Saskatchewan Government performing a key leadership role. To ensure that biodiversity conservation is integrated with all government priorities, this planning initiative is intended to incorporate involvement from a broad cross section of government departments and the public. In recognition of the scope of this task and the vastness of the issues, the Saskatchewan Biodiversity Interagency Steering Committee (ISC) was established. The committee is composed of eleven government departments and agencies, and is assisted by a Biodiversity Working Group consisting of staff within Saskatchewan Environment and Resource Management. In consultation with Saskatchewan residents, the ISC will work towards the development of a Saskatchewan Biodiversity Action Plan that will guide the activities of the Provincial Government for a five year period from 2001 to 2005.

What is Biodiversity?

Biological diversity or biodiversity includes all species of plants, animals and microorganisms and the ecosystems and ecological processes of which they are parts. It is a term to represent nature's variety, including both the number and frequency of ecosystems, species and genes.

Biodiversity can further be defined at three different levels: genetic diversity, species diversity and ecosystem diversity.

Genetic diversity is the sum total of genetic information contained in the genes of individuals of plants, animals and microorganisms on earth.

Species diversity refers to the variety of living organisms on earth, which is estimated to be between five and 50 million species, though only about 1.4 million have actually been described.

Ecosystem diversity relates to the variety of habitats, biological communities and ecological processes (fire, insect, disease, etc.), as well as the tremendous diversity within ecosystems.

Why is Biodiversity So Important

Saskatchewan has a rich legacy of biodiversity and is steward to a diverse and ecologically significant array of ecosystems. The province's identity is shaped by its landscapes, aquatic systems and wildlife. Our biodiversity underpins Saskatchewan's economy and is a source of sustenance, as well as cultural, recreational and spiritual well being.

The natural wealth of this province is a foundation for the well being of present and future generations. This wealth includes fertile soils, diversity of biological species, productive forests, fisheries and grasslands. From biodiversity we derive an array of important life sustaining goods and services including clean air and water, medicine, agricultural products and timber. This natural wealth is a capital asset of enormous magnitude to Saskatchewan both through direct economic goods and essential natural services. If managed properly, biodiversity will yield a sustainable flow of benefits to Saskatchewan residents now and in the future.

Economic goods derived from the diversity of species includes the harvest and trade of products which represent important and familiar parts of our economy including:

- ***Agricultural Goods:*** All of our food originates from wild species or wild species brought into domestication. Wild species in biodiversity's "genetic library"

Biodiversity (short for Biological Diversity) is the spectacular variety of life on earth and the essential interdependence among all living things.

account for approximately 50 per cent of the annual increases in crop productivity accomplished by biotechnological and agricultural research.

- ***Forest Industry Goods:*** Products from natural and managed forests include lumber, pulp, paper, firewood and other fibre products.
- ***Pharmaceuticals:*** Most of our medicines originate from wild species, nine of the top 10 prescription drugs used in North America are products of biodiversity, based on natural compounds from plants, fungi, animals and microorganisms. Globally, 80 per cent of the human population relies on traditional medicine of which 85 per cent use wild plant extracts. Over the counter plant-based natural medicines have a global market value of $84 billion per year.
- ***Harvest of Fish and Wild Game:*** Wild game forms the basis and/or supplements the diets of many Saskatchewan residents. Hunting and fishing also contributes to the economy of the province, it is estimated that economic activity from hunting totals one hundred and fourty million and from fishing and four hundred and fifteen million annually.
- ***Enjoyment of Nature:*** The beauty of nature and the enjoyment that humans obtain from interactions with other species are intangible but very real components of the fulfilment of the human experience. Tourist activity related to non-consumptive outdoor recreation accounts for $77 million in Saskatchewan and is expected to be a significant area for economic growth in the future.

Biodiversity also provides essential ecosystem services. Generally, ecosystems with higher levels of native biodiversity are more resilient to change, both natural and human-produced. Although it is extremely difficult to pinpoint the global economic value of these services, ecological economists place it annually in the trillions of dollars. Ecological services include:

- ***Soils and Nitrogen Fixation:*** The formation and maintenance of soils for agriculture and fixation of nitrogen by microorganisms into forms usable by plants.
- ***Biological Control of Pests:*** Crop and forest pests would be a much larger problem for society except for biocontrol provided by natural predators.
- ***Pollination:*** The agricultural value of pollinator services is estimated to be in the billions. One third of all human food is produced by 70 per cent of crop plant species which require insect or other animal pollinators to produce seeds.
- ***Grazing:*** Grasslands support animals used for labor as well as animals where parts or products are consumed (including milk, meat, wool and leather). Grasslands are also the original source of most domesticated animals and crops.
- ***Removal and Storage of Atmospheric Carbon Dioxide:*** Presently, more that half of the carbon dioxide produced by the combustion of fossil fuels does not accumulate in the atmosphere but is removed and returned to nature. It is being recognized that soils and forests are significant for sequestering carbon.
- ***Flood Control:*** Every year about $6x10^{25}$ cubic feet of water falls as rain onto the earth's land surfaces. Soil soaks up much of this water and gradually meters it out to plant roots or into aquifers and surface streams. Living vegetation with its deep roots and above ground evaporating surface serves as a giant pump, returning water from the ground to the atmosphere.

Maintaining Biodiversity: The Challenge

"We consider species to be like a brick in the foundation of a building. You can probably lose one or two or a dozen bricks and still have a standing house. But by the time you're lost 20 per cent you are going to destabilize the entire structure. That's the way ecosystems work."

Don Falk, 1999

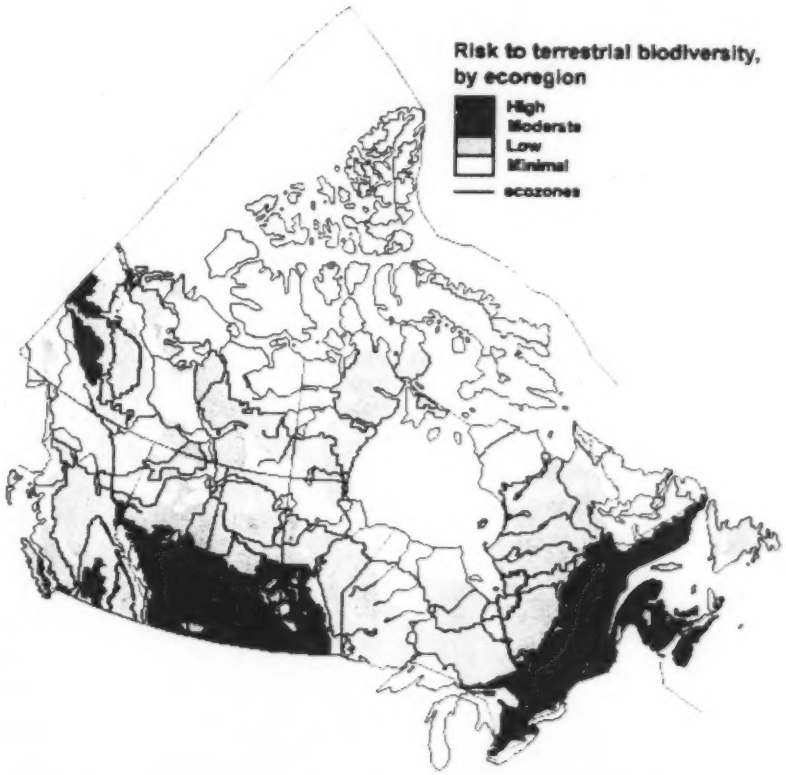
Global societal risks to biodiversity stem from population growth and unfettered economic growth. In Saskatchewan, the principal threats to land and aquatic biodiversity can be summarized under five main headings including habitat loss and fragmentation, non-native species invasion, pesticides and pollution, over-harvesting and global warming.

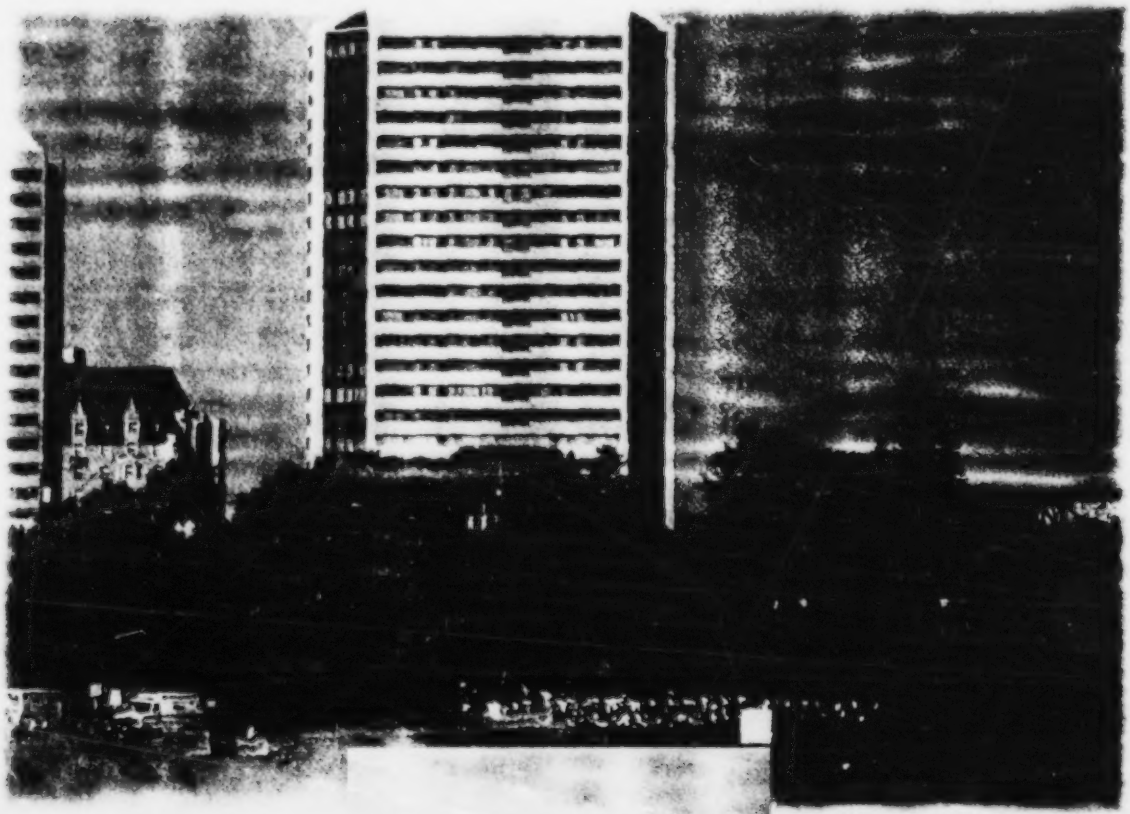
Habitat loss and fragmentation is the most serious problem, especially in southern Saskatchewan where most of the native prairie has been cultivated and the highest density of roads exist. Aquatic systems, such as streams, are also fragmented by things such as dams, poorly-constructed road crossings and other barriers.

The next most serious problem is non-native species invasion. Hundreds of species have been deliberately or accidentally introduced into the province and some have become serious threats to our native species. For example, purple loosestrife can completely displace native vegetation, European carp destroy habitat for other fish and non-native ladybugs may out-compete their native counterparts. Many of these non-native species, as with weeds, are also serious agricultural pests.

The widespread use of many different kinds of herbicides and insecticides also pose a threat to the province's biodiversity. This is because most of them are not target-specific and thus kill many other beneficial native plants and insects. Their use also promotes the evolution of resistance in the pests themselves, reducing the efficacy of the pesticides.

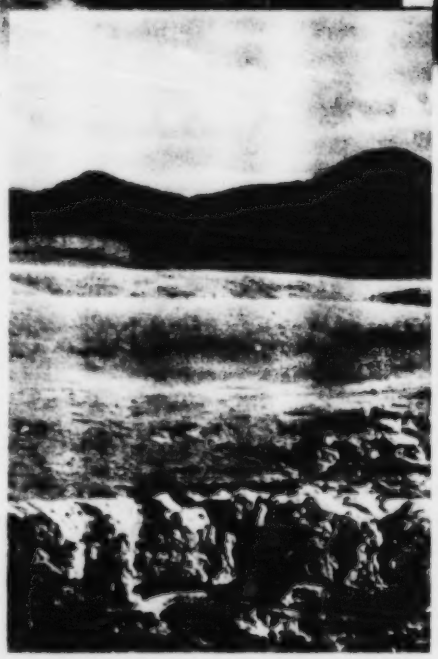
The over-harvesting of native species, although now regulated, can still be a serious local issue. For example, research has shown that stocks of





lake fish dwindle rapidly once a lake has road access.

Finally, global warming is acting in concert with the other factors to exacerbate the impacts on native species in Saskatchewan. Natural climatic variation induces species to expand or contract their ranges. If global warming continues, it is likely to increase this requirement for range movement. However, movement of species in the south is very difficult due to extensive habitat loss and fragmentation. It is vital, therefore, that there be linkages or corridors established across ecosystems to allow the uninhibited movement of these species and their genes.



Biodiversity Conservation - What Actions, At What Cost and What Benefits

Conservation of biodiversity means *"managing human uses of the Earth's resources in order to maintain ecosystem, species and genetic diversity and the evolutionary and other processes that shaped them. Conservation includes the option to use resources.... Changes to the composition and structure of ecosystems, the extinctions of species and changes in the genetic diversity of any one species are natural processes that occur over time.... Conservation of biodiversity requires us to eliminate or reduce adverse impacts to biodiversity that result from human activity."*

(Canadian Biodiversity Strategy. 1995. p.18)

The Saskatchewan Biodiversity Action Plan will provide an umbrella for a variety of provincial actions to achieve long term conservation of biodiversity and the maintenance of essential ecological processes and life support systems. This will involve innovative policies. plans, programs, legislation, third party support, economic incentives, etc. An important consideration is that the short term economic gain in many situations may be outweighed by both the long-term ecological, economic and human health costs to society of non-sustainable use.

Specific actions will be aimed at:

- improving understanding of the value of biodiversity and providing opportunities to contribute to the development and implementation of land and resource use policies, plans and programs;
- enhancing efforts to conserve biodiversity where it naturally exists and to sustainably use our biological resources, particularly in resource based economic sectors such as agriculture and forestry;
- making the transition to ecosystem based management built on a better understanding of how ecosystems function, comprehensive and reliable biological inventories, information sharing and integrated planning and monitoring systems; and
- ensuring an appropriate mix of legislation and incentives in order to encourage biodiversity sensitive behavior.

A number of the areas for action suggested in this discussion paper are either activities currently underway or will be relatively low cost. Other suggested areas for action. however. represent significant costs to government or individuals as lost opportunities, lost revenues or increased management costs. In some cases, the impact of action is not in net costs or benefits but a change in who benefits from the use or non-use of the land.

Against these costs are the benefits of biodiversity conservation. Generally, what is good for the environment is also good for the health of the residents of Saskatchewan and for the long-term economy of the province. These benefits are difficult to quantify in dollar terms and in contrast to the direct benefits of the use of biological resources, the conservation of biological diversity benefits society as a whole, making it much more difficult to assess. What is known is that protecting biodiversity will have a direct cost to the province in the short term, but will benefit all Saskatchewan residents in the long term.

We as a society will need to determine what conservation actions we are willing to endorse and what are the acceptable costs of those actions. But more importantly, we need to balance this with what are

the acceptable costs to the environment of our actions and inaction. The action plan will examine the tradeoffs between economic, social and ecosystem needs in both the short and long term. The plan will also identify what steps the people of Saskatchewan are willing to take and to what extent we are committed to biodiversity protection.

Biodiversity Conservation - A Global Objective

Recognition of the world wide importance of biodiversity conservation inspired the global community to successfully negotiate the *United Nations Convention on Biological Diversity* in Rio de Janeiro in 1992. The ground breaking treaty, opened for signature at the Earth Summit in June 1992, has now been ratified by more than 170 countries including Canada. The objectives of the *Convention* are:

- the conservation of biodiversity;
- the sustainable use of biological resources; and
- the fair and equitable sharing of benefits arising from the use of genetic resources.

(Canadian Biodiversity Strategy, 1995 pg.8)

Canada's primary response to the *Convention* was the development of the *Canadian Biodiversity Strategy* (CBS). Developed with participation of the federal, provincial and territorial governments along with broad public involvement, the CBS is a national framework that puts the *Convention of Biodiversity* into the Canadian context.

Saskatchewan is the second province (after Quebec) to initiate development of an action plan. It is intended to guide the efforts of the provincial government from 2001 - 2005.

June 1992	The United Nations tables the *Convention on Biological Diversity*.
December 1992	Canada becomes the first industrialized nation to ratify the *Convention*.
1995	All provincial, territorial and federal governments conclude public discussions.
	Canada releases the *Canadian Biodiversity Strategy*.

Development of a Saskatchewan Biodiversity Action Plan

May 1995	Government of Saskatchewan endorses the *Canadian Biodiversity Strategy*.
November 1998	The Saskatchewan Biodiversity Interagency Steering Committee is established.
February 1999	Saskatchewan releases the *Conserving Saskatchewan's Biodiversity: A Progress Report*.
Next Steps	Public input into the development of a Biodiversity Action Plan for Saskatchewan - focusing on the framework.
	Public comment of a Draft Biodiversity Action Plan for Saskatchewan.
	Government of Saskatchewan endorsement and implementation of the Saskatchewan Biodiversity Action Plan.

A Discussion Document to Develop a Saskatchewan Biodiversity Action Plan

The following sections collectively provide a framework for the development of a Biodiversity Action Plan for Saskatchewan. The proposed Vision and Principles lay the foundation for the framework providing an outline of basic beliefs to guide the development of the Action Plan. The 36 objectives offer a starting point to direct the actions towards biodiversity conservation in Saskatchewan.

Proposed Vision Statement for an Action Plan

Saskatchewan residents are privileged to live in a province rich in its diversity of peoples, landscapes and watersheds - ranging from prairie grassland to boreal forest and sparsely treed shield, from sand dunes to wetlands, to abundant rivers and bogs - all supporting life of many descriptions. With this privilege comes the responsibility to care for this inheritance on behalf of present and future generations.

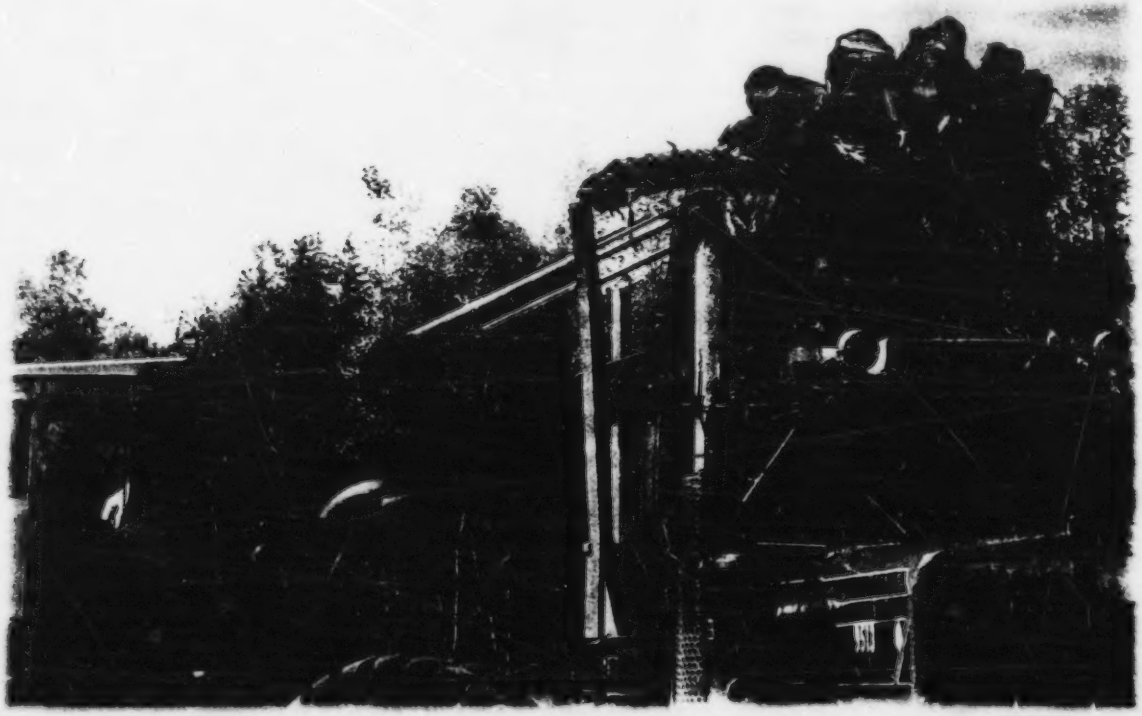
We must act with wisdom and prudence today to ensure we leave future generations, a nurturing and dynamic environment rich in its biodiversity.

Proposed Principles for an Action Plan

Stewardship of the environment is the responsibility of all Saskatchewan residents. The following principles support biodiversity conservation and the sustainable use of biological resources.

- ***Shared Responsibility:*** We depend on biodiversity for our physical, economic and cultural needs and have a responsibility to contribute to biodiversity conservation and to use biological resources in a sustainable manner. Residents of Saskatchewan including private landowners and land managers, all levels of governments, Aboriginal peoples, interest groups, industry and other agencies must work together to identify problems and opportunities and find common solutions.

- ***Effective Public Participation:*** The province will encourage understanding and appreciation of the value of biodiversity and ecological processes and will also encourage all Saskatchewan residents to participate in stewardship of biological resources.
- ***Ecosystem Based Management:*** Healthy, energetic, natural ecosystems and the maintenance of ecosystem processes in their natural surroundings are prerequisites to conservation of biodiversity and the sustainable use of biological resources. An ecological approach to resource management is central to conserving biodiversity and ecosystem health while supporting society's needs.
- ***Balanced Values:*** Use of biological resources must acknowledge and balance the ecological as well as economic, social and cultural values.
- ***Knowledge Based Decisions:*** The conservation of biodiversity and the sustainable use of biological resources should be carried out using the best knowledge, innovations and practices available including science based, Aboriginal traditional ecological knowledge and local knowledge.
- ***Leadership:*** The Saskatchewan Government will provide leadership in biodiversity conservation. Government, in partnership with other agencies and organizations, will work effectively and efficiently to integrate and harmonize programs and policies to ensure long term integrated management of the environmental, economic, social and cultural benefits of biological resources.



How Can We Protect Biodiversity In Saskatchewan?

Goal 1: Conservation and Sustainable Use

To conserve biodiversity and use biological resources in a sustainable manner

The people of this province have always used biological resources for food, clothing, medicine, fuel and shelter. Residents have claimed the vast expanses of prairie and forest as their home and have thrived thanks to the wealth of natural resources. The last 100 years of human activity, including agricultural settlement and urbanization has left an indelible mark on most of this province and on its living resources including wildlife, forests and agricultural lands. That period of our history focused on landscape modification - particularly agricultural and urban development and resources extraction. Over 20 million hectares of land have been converted from native prairie to cropland or seeded forages. Saskatchewan has also developed an extensive system of roads, highways and utility corridors. The loss of native habitat by modifying the landscape has a severe impact because it often implies loss of biodiversity on the lands affected.

Included in this section are objectives for six areas. The first two objectives address the key initiatives towards ecosystem management: to establish and manage protected areas and the sustainable use of biological resources. The following four objectives are presented to address direct threats to biological resources including: biodiversity at risk, climate change, pesticides and pollution, and harmful non-native organisms and genetically modified organisms.

The following sections strive to provide a better understanding of the risks created by human activities to biological resources and of the challenges facing the government to ensure that necessary actions to maintain biological diversity are implemented.

Establish and Manage Protected Areas

The World Conservation Union (IUCN) provides an internationally recognized system of classifying lands and waters according to the objectives by which they are managed. The categories range from I to VI, with IUCN Level I providing the highest level of protection. In Saskatchewan, approximately 6.4 per cent of the landscape is protected under all six categories. This includes national and provincial parks, ecological reserves, community pastures, *Wildlife Habitat Protection Act* lands, etc. Most of the protected areas (categories I through III) and management areas (categories IV to VI) are located in the Boreal Plain and Prairie Ecozones. In the Prairie Ecozone, where over 80 per cent of the population of the province lives,

Objective 1:

Complete a network of representative areas.

Areas for action could include:

- ensuring that representative areas are designated in each of the province's eleven ecoregions; and
- ensuring that representative areas adequately capture a range of biodiversity and landscapes in each of the ecoregions.

Objective 2:

Develop and implement management plans for protected areas.

Areas for action could include

- preparation and implementation of management plans for wilderness and natural environment provincial parks and ecological reserves;

- encouragement and support for the development of management plans for representative areas administered outside of provincial government; and
- working with private landowners and industry to encourage management of adjacent lands in a way that will conserve biodiversity, species migration and habitats.

Objective 3:

Effectively manage the harvest of wild fauna and flora of Saskatchewan without compromising ecosystem integrity.

Areas for action could include:

- strengthening partnerships with Aboriginal peoples for the stewardship of renewable resources, for which they have a right of access;
- encouragement and support to agriculture and industry in the sustainable use of renewable resources;
- managing wild species within sustainable harvest levels, understanding what, when and how much can be harvested without compromising the diversity of all species inhabiting the ecosystem;

only 0.6 per cent of the landscape is classified as protected area, with nine per cent classified as management area.

In response to the need to conserve additional areas in their natural state, the province established a Representative Areas Network (RAN). The network is striving to include representative examples of each of Saskatchewan's landscape types. To date, the program has successfully established new representative areas in several ecozones. New sites continue to be added to the network with a commitment to complete the RAN in the year 2000.

Several challenges remain including development of management plans for protected areas administered by the province and representative areas administered outside of government to support the continued conservation of biodiversity.

Sustainable Use of Biological Resources

Sustainable use of natural resources presents a challenge given the numerous and diverse land uses that occur in the province. These include: forestry, agriculture, resource extraction, urbanization, subsistence harvesting and recreation.

Hunting and fishing, whether for subsistence, recreation or profit can potentially pose a risk to biodiversity due to the minimal information available on big game populations and total harvest rates. There is a need to continue to work with subsistence harvesters to monitor the harvest taken by all sources including Aboriginal hunters, fishers and gatherers who possess treaty or Aboriginal rights to subsistence harvesting. Better data will

ECOREGIONS OF SASKATCHEWAN

TAIGA SHIELD ZONE

A Selwyn Lake Upland

B Tazin Lake Upland

BOREAL SHIELD ZONE

C Athabasca Plain

D Churchill River Upland

BOREAL PLAIN ZONE

E Mid-Boreal Upland

F Mid-Boreal Lowland

G Boreal Transition

PRAIRIE ZONE

H Aspen Parkland

K Moist Mixed Grassland

M Mixed Grassland

N Cypress Upland

assist users and managers in ensuring the sustainable use of game species in the province.

Potential overexploitation problems also exist for other species. One example is the growing interest in the recreational and commercial harvest of wild plants for medicinal purposes. Presently there is no regulation of wild plant species except for those which occur on Crown lands or where a plant is listed as a species-at-risk.

Other harvesting activities, including forestry and grazing of native grassland, if improperly managed, can pose a risk to non-targeted species and ecosystems. Without careful management of grazing and harvesting practices, the results can lead to significant habitat change, degradation and loss.

Biodiversity at Risk

To date in Saskatchewan, 15 plants and animals have been provincially designated under the species-at-risk provisions of *The Wildlife Act*. This list will grow as more species are assessed. Saskatchewan is presently evaluating another 39 species. In addition to those species legislated, other species at risk are identified through ranking systems including the Conservation Data Centre status reports, which provide a census of Saskatchewan's species abundance.

All species are potentially at risk. Habitat loss is considered to be a major factor, although in many cases there is not sufficient information to reliably determine population trends or to understand the risk to a species. Some species have naturally low population densities which can place them at risk. For other species, population densities are low within the province because they are at the edge of their natural range.

Presently, scientists estimate that less than 20% of the species of this province have been identified. In order to ensure that we conserve species and genetic diversity we must protect and manage entire ecosystems. Objectives need to identify areas and species most at risk and outline restoration and rehabilitation strategies through an ecosystem approach, as well as encouraging biodiversity

- research, development and implementation of methods to reduce adverse impacts from harvesting practices including loss of non-targeted species and habitat destruction in both terrestrial and aquatic ecosystems; and
- maintaining close association with other jurisdictions and agencies which share responsibility for maintaining biodiversity beyond the borders of the province.

Objective 4:

Support and promote non-government agencies, local governments and private landowner stewardship of landscapes across the province.

Areas for action could include:

- wherever possible facilitate the protection of biodiversity on privately owned lands via stewardship initiatives and incentives including conservation easements and partnership agreements to preserve species, habitats and land forms;
- supporting improved range management practices on Crown and private grazing lands; and
- supporting programs that encourage the conversion of marginal cropland to permanent cover and lower impact land uses including grazing, haying and ecotourism.

Objective 5:

Assess the need, develop and implement plans for the conservation, restoration and rehabilitation of ecosystems components at risk.

Areas for action could include:

- conservation of natural terrestrial and aquatic ecosystems across the province with priority for ecosystems which are most at risk;
- restoration and rehabilitation of natural ecosystems where biodiversity is at the greatest risk from human activities; and
- establish policies which may be set by provincial and local governments allowing natural disturbances including fire, succession and natural forest regeneration to maintain biodiversity where they are compatible with land use objectives.

Objective 6:

Continue to provincially legislate species-at-risk and ensure conservation of natural habitats.

Areas for action could include:

- using an ecosystem based management approach to species recovery planning for areas that contain numerous species at risk;
- maintain a mechanism to support the process to review, designate and recovery plan for species at risk;

conservation on private and corporately owned lands.

Climate Change

Most researchers have concluded that the accumulation of greenhouse gases, including carbon dioxide, nitrous oxide and methane in the atmosphere, is causing climate change and increased climate variability. These gases trap the heat of the sun next to the earth in much the same way as the glass of a greenhouse. Although these gases occur naturally, human activities such as the burning of fossil fuels and changing land uses are leading to increased concentrations.

In Saskatchewan, with the expected changes in climate, there may likely be an increase in temperatures and possibly frequent and severe drought. The extent and rate of climate change may exceed the capacity of many species for acclimation or genetic adaptation. Loss of species is expected to be most severe in the Prairie Ecozone because it is most fragmented by human activities and species migration is not a possibility. Saskatchewan will continue to participate in national efforts to reduce emissions of greenhouse gases and sequester carbon as well as to address the need for solutions to mitigate the effects of climate change on biodiversity.

Pesticides and Pollution

The use of pesticides poses a significant risk to biological resources as large areas of agricultural crops are treated with insecticides and herbicides. The product registration system, storage program and application requirements are currently in place to minimize impacts on non-target species. However, even if harmful effects on the more visible species are being regulated, there may be unknown effects on non-targeted invertebrates, soil microbes, etc. With a few exceptions, the potential impacts of crop protection products on native terrestrial and aquatic biodiversity have not been fully evaluated.

In considering the impacts on biodiversity, it is important to remember the most serious effects are often not immediately obvious. While some organisms may survive a pesticide application, they may be sufficiently weakened that other factors become decisive in their ability to survive and reproduce.

The widespread use of pesticides and the complexity of potential ecological effects require continued research into the effects of pesticides, the regulation of their use and development of alternatives.

Pollution (air, water, soil) can occur through a variety of sources including oil and gas extraction,

vegetation damage due to potash mining, industries such as smelters, pulp mills and factories, urban concentration, livestock production and agriculture. Much of the damage from these sources has very local impact and can often be reduced through the environmental impact assessment process and/or mitigated with ongoing regulation. Objectives need to ensure threats to biodiversity are minimized. One outstanding issue from industrial pollutants is acid rain. Long-range, often trans-border, transport of pollutants can acidify sensitive lakes and stress aquatic ecosystems resulting in loss of biodiversity. Acid rain monitoring and reduction must continue in northern regions which are at most risk within the province due to the soil types of the surrounding watersheds.

Harmful Non-Native Organisms and Genetically Modified Organisms

Many non-native species have little or no effect on native biodiversity, but it is those that spread rapidly and aggressively which can have profound effects on natural ecosystems. Harmful non-native species (e.g. leafy spurge, purple loosestrife) may affect biodiversity through species displacement, disease, parasitism, hybridization, predation or habitat destruction. Harmful non-native species can enter ecosystems through deliberate or inadvertent introduction by humans.

Invasion of native grasslands, forests and riparian areas by exotic plant species is considered to be a major threat to biodiversity in the province. Research is needed to evaluate the extent to which exotics have affected natural systems. Policies are required to ensure no further intentional releases to natural systems of invasive non-native species occur and to help reduce the influx of new species into the province. This will provide not only a protection benefit to biological resources, but will also reduce the introduction of exotic species which are harmful to agriculture, forestry and aquatic ecosystems.

Genetically modified organisms (GMO's) result from biotechnology advances. They can offer the

- continuing to maintain support and harmonize recovery planning within the province with national and international efforts; and
- enhancing participation of urban and regional governments, local and Aboriginal communities and land owners in species recovery projects at early phases of project planning.

Objective 7:

Conserve biological resources, outside their natural habitats, for wild species which are at risk and where conservation in a natural area has failed.

Areas for action could include:

- supporting federal programs to ensure conservation of genetic diversity through gene banks to maintain seed stock of species-at-risk, forestry species and genetic materials essential to agriculture.

Objective 8:

Work cooperatively on the national climate change agenda.

Areas for action could include:

- working with the federal government to reduce greenhouse gas emissions through the national climate change agenda;
- continuing research and implementation of carbon sequestration programs for agricultural lands, forests, wetlands and grasslands;

potential for important economic and social benefits, such as improved nutritional quality and reduced need for pesticides.

However, there is little experience with environmental introductions of GMO's on which to base an assessment of their potential risks to biodiversity. Environment Canada has the leading role in developing a federal framework for regulating biotechnology products.

- consultation with urban and rural municipalities on the cumulative effects of land use change relative to climate; and
- working with industry and urban/rural municipalities to reduce use of fossil fuels.

Objective 9:

Examine climate change impacts on biological resources and implement strategies to mitigate impacts.

Areas for action could include:

- establishing biological monitoring systems to track the effects of changing climates on ecosystems; and
- identifying the primary response of ecosystems and their supported biodiversity to climate change and develop and implement strategies to mitigate the impacts on biological resources.

Objective 10:

Reduce or eliminate the release of substances harmful to biodiversity.

Areas for action could include:

- continuing monitoring and research of the release of substances including pesticides;
- continuing efforts to reduce industrial pollution including activities which result in air, soil and water contamination;
- researching alternatives to the use of domestic, agriculture and forest pesticides, including natural control systems and biological controls; and
- encouraging the adoption of integrated pest management, using a range of techniques to suppress pests effectively, economically and in an environmentally sensitive manner.

Objective 11:

Formulate provincial policy and management strategies on non-native organisms.

Areas for action could include:

- developing and implementation of effective means to identify and monitor non-native organisms;
- ensuring non-native species are not introduced in the province until ecological implications are understood; and
- ensuring there is legislation and enforcement to control the introductions or escapes of harmful non-native organisms.

Objective 12:

Ensure that Saskatchewan biodiversity resources are reasonably protected from any potential risks that may arise from genetically modified organisms.

Areas for action could include:

- supporting the federal government in the development of a framework for managing potential benefits and risks associated with genetically modified organisms, including criteria for assessing the impacts of GMO's on ecosystems; and
- supporting the federal government in developing measures and controls that will mitigate the impact and enhance the potential benefits of genetically modified organisms.

Goal 2: Ecological Management

To Improve Our Understanding of Ecosystems and increase our resource management capacity.

In recent years, the province has made significant progress in establishing an ecological land classification system which is a foundation for ecosystem based management and planning. Attention needs to focus on other information needs, and ecological monitoring, to support management and planning efforts. To be useful, ecological information needs to be communicated broadly - among professionals, the general public and decision makers. Although considerable information currently exists, it needs to be compiled within information systems that will make it comprehensible, allow for updating and accessible to all concerned.

Information and Research

A key obstacle to biodiversity conservation is the lack of information about Saskatchewan's ecosystems, their current status and the impacts of human activities that pose a threat to biodiversity. We lack basic biological inventory information about species diversity and distribution. Classification systems need to be improved and applied to incorporate aquatic perspectives and biological communities. We need to improve our understanding of how ecosystems function, at what thresholds might they change drastically and how ecosystems can be sustained and at the same time support economic use. Since there will never be enough information to satisfy all concerned, there needs to be a strategy to identify priorities.

Science is only one of many sources of useful information for conserving biodiversity. In management of biological resources it is important to ensure decisions are made using the best available information. Those who live and whose livelihood are most closely linked to the land and natural resources - Aboriginal peoples, ranchers and farmers - are also an important source of information concerning the values of ecosystems (biological, economic, social and spiritual). Their information can also be used in the management of ecosystems. These perspectives are not well known, understood or integrated with scientific information.

While inventory is largely the purview of the province, the federal government can play a significant role in addressing research related to other information needs. For example, the Canadian Wildlife Service, Prairie Farm Rehabilitation Administration and Canadian Forest Service can provide a critical service by addressing key research questions that directly support provincial policy development and management

Objective 13:

Enhance biological inventory programs, collections and associated communications.

Areas for action could include:

- working with the Saskatchewan Conservation Data Centre, the Universities of Saskatchewan and Regina, etc., review the need, capacity and support required for maintaining biodiversity collections and to effectively disseminate the information relevant to biodiversity conservation;
- reviewing existing information and management needs and establishing priorities for biological inventories;
- soliciting support of others involved in inventories (federal government,
- non-government organizations, universities) to support provincial priorities; and
- conducting priority inventories.

efforts. Other sectors such as universities, non-government organizations and industry also have an interest and even obligation to conduct research and monitoring.

Planning, Decision and Environmental Assessment

Biodiversity conservation could benefit from enhanced decision making as it relates to land and resource use planning and management. There's an opportunity for the provincial government to adopt a more integrated, cross department and ecosystem based management approach to its activities and provide

Ecosystem Based Management

What is it?

- Ecosystem-based management is a relatively new concept being widely adopted by natural resource managers. It is "the integrated management of ecological systems and human activities to maintain or enhance the health and integrity of an ecosystem including ecosystem function and structure."
- functioning ecosystem is defined as being healthy when it can endure natural and human induced disturbance and yet continue to persist over time. The focus is no longer solely on the resource, or a single state, issue, area or species management. Ecosystem-based management recognizes the complex interrelationships between and among species, their habitats, natural processes and humankind. For example, instead of a management focus on individual species such as walleye or moose, efforts are now directed towards maintaining the integrity of the broader habitat, landscapes or ecosystems in which these species, along with many others, live.

What's an Ecosystem?

- An ecosystem is "an interdependent system consisting of all living organisms in a naturally defined geographical area, the physical and chemical factors of their environment and the processes that link them". For example, a woodlot can be defined as an ecosystem that includes a variety of trees, shrubs, non-woody plants, algae, fungi, earthworms, spiders, mites, centipedes, birds and rodents as well as non-living components such as soil, rotting logs, rocks, ponds, streams and hill-sides.
- The living and non-living parts of an ecosystem interact with each other and each ecosystem component provides or contributes to the health and stability of the entire ecosystem.
- Ecosystems can be large or small. A dugout is an ecosystem, as is the entire boreal shield ecozone. The scale of an ecosystem is defined based on the management question that needs to be addressed.

Healthy ecosystems are life supporting. Why?

- They sustain biodiversity and the wealth of our natural, renewable resources.
- They retain options for future generations.
- They provide services that maintain human health - protection of air and water as well as ecosystem health, erosion control and flood control.

Principles of ecosystem-based management

- To help ensure that resource management plans and actions are consistent with ecosystem management, six principles are being promoted to provide guidance:
- Focus on the long-term view;
- Concentrate on ecosystem health and integrity;
- Make decisions based on scientific and traditional knowledge and human values;
- Involve those who will be affected by decisions, or who have an interest in the outcome;
- Use adaptive management by learning from experience; and
- Look at the big picture.

leadership for effective, community-based decision making processes involving both local, provincial and national businesses impacted by the process. The value of planning, public involvement, science, research, Aboriginal traditional ecological knowledge and local knowledge and experiences needs to be recognized and meaningfully considered in the decision making process. Environmental considerations need to be built into all development and program proposals, along with economic and social considerations. Environmental impact assessments need to include a biodiversity focus and be harmonized across political boundaries.

Monitoring

Monitoring entails a variety of activities essential to future planning and management. The premise that "healthy" ecosystems maintain biodiversity requires that there be some method to measure ecosystem integrity on an on-going basis. This will provide a significant contribution to the Province's State of Environment reporting. Monitoring the response to development or management activities is also required. Where desired results are not achieved, in light of the principles of ecosystem based management (i.e. adaptive management), actions need to be revised.

Objective 14:

Develop ecological classification systems and inventories.

Areas for action could include:

- develop and apply an aquatic classification system and link it with the existing land classification approach; and
- development and application of a vegetation community classification approach.

Objective 15:

Develop and maintain ecosystem information management systems and analytical tools.

Areas for action could include:

- development of an ecosystem information system for the province, compiling existing information and entering it into the system, ensuring the system is maintained and updated and that the information is widely accessible; and
- development and application of methodologies for analyzing the information and communicating the results widely.

Objective 16:

Use Aboriginal traditional ecological knowledge effectively to support biodiversity conservation and sustainable use of resources.

Areas for action could include:

- encouraging and supporting the implementation of efforts by Aboriginal peoples to document and communicate Aboriginal traditional ecological knowledge, innovations and practices;
- determining the relationship between Aboriginal traditional ecological knowledge, local knowledge and established science and integrating these sources to ensure the best available knowledge is used in biodiversity conservation initiatives; and
- disseminating Aboriginal traditional ecological knowledge to those developing provincial policies and plans.

Objective 17:

Identify mechanisms to use landowner's (e.g. farmers, ranchers) local knowledge, innovations and practices to support biodiversity conservation and sustainable use of biological resources.

Areas for action could include:

- documenting, evaluating and disseminating local knowledge to those developing provincial policies and plans for consideration.

Objective 18:

Support research that increases our understanding of the province's biodiversity and its management.

Areas for action could include:

- the identification of priority research needs along with opportunities for potential support/partnership and communication to federal agencies, academia, etc. Priorities include:
  - collaborate with Elders in preserving Aboriginal traditional ecological knowledge;
  - collect local knowledge;
- the sustainable use of biological resources and methods to reduce adverse impacts; and
- social and economic benefits and impacts of biodiversity conservation, integrated (environment, social and economic) policy, planning, program development and management.

Objective 19:

Track and disseminate research information relevant to provincial biodiversity conservation.

Areas for action could include:

- establishing a system to track and disseminate biodiversity research and information to a broad user group including industry and landowners.

Objective 20:

Encourage municipalities, Aboriginal peoples, the agricultural community and other land management agencies to adopt an ecosystem based management approach while respecting administrative jurisdictions.

Areas for action could include:

- an ecosystem based management approach to be applied throughout government to Crown land and resource use planning and ensure that biodiversity conservation or impacts on biodiversity are considered;
- Crown land management planning should focus on benchmark protected areas, ecosystems at risk (e.g. grasslands) and disturbed habitats; and
- encourage municipalities, Aboriginal peoples and other land management agencies to adopt an ecosystem based management approach.

Objective 21:

Continue to use the environmental assessment process and cumulative impact assessment to determine potential impacts of developments on ecosystems and to recommend appropriate ways to avoid or reduce them to acceptable levels.

Areas for action could include:

- encouraging and supporting the integration of biodiversity conservation objectives with industrial land and resource use planning and by individual land owners;
- identifying opportunities and priorities for biodiversity conservation by industry and individual land owners and establish guideline information, best management practices, etc;
- incorporate the concept of cumulative impacts into the environmental assessment process; and
- development of ways to harmonize environmental assessments across provincial and national boundaries where appropriate to lead to improved cooperation and better environmental protection.

Objective 22:

Conduct follow-up monitoring of resource management practices and use.

Areas for action could include:

- management activities conducted or regulated by the province that potentially impact on biodiversity should be monitored to ensure objectives are being met.

Objective 23:

Establish a province wide biodiversity monitoring program and link it with other jurisdictions.

Areas for action could include:

- development of ecological monitoring systems by ecoregions;
- establishing a provincial monitoring system based upon a set of agreed upon indicators, long term monitoring sites and reported on in the Provincial State of Environment Report;
- linking to national efforts to establish a national monitoring network; and
- utilizing protected areas as benchmark sites for long-term ecosystem-based management practices.

Goal 3: Education and Awareness

To promote an understanding of the need to conserve biodiversity and use biological resources in a sustainable manner.

If national and provincial efforts to conserve biodiversity are to succeed, individuals and communities must understand and appreciate the value of biodiversity and the causes of its decline. Goal Three recognizes that education can be an effective means of changing public perspectives on biodiversity. There is a lack of information provided to society which would assist individuals in their understanding of the ecosystem and the social and economic implications of the loss of biodiversity. In addition, there is a need to increase the environmental literacy of our society in general. As well, we must ensure inter-disciplinary information sharing and encourage linkages between all sectors of society including government, academics, non-government agencies and industry. Actions need to be identified to accomplish environmental literacy in four areas: formal education, the general public, Aboriginal partners and stakeholder organizations and information and technology transfer.

Objective 24:

Ensure biodiversity is included in provincial education systems.

Areas for action could include:

- support of educational activities which sensitize students towards the value of biodiversity as well as the importance of conservation and sustainable use of biodiversity from kindergarten to grade 12 and selected post-secondary education programs;
- integration of biodiversity conservation and sustainable use themes into training programs and continuing education programs for educators; and
- encouragement of individual contact with the natural environment to foster a feeling of connection with the environment and provide hands on experience and knowledge.

Formal Education

Biodiversity themes should be enhanced within formal education programs, relaying the individual responsibility that each of us share towards biodiversity conservation and ensuring that individuals have the capability to take action in the context of their everyday lives. To accomplish this, training and continuing education programs are needed to assist educators in building environmental concerns into their teaching. The challenge to teachers is to go further than communicating environmental knowledge, to also teaching the skills which would allow students to make lifestyle and consumption decisions that are sensitive to biodiversity.

General Public, Aboriginal Partners and Stakeholder Organizations

Biodiversity education and community awareness can be strengthened in a variety of ways to reach a wide range of people. Biodiversity themes should be incorporated in other education systems, as well as within non-formal settings such as museums, nature centres and parks. Awareness-raising and education also need to take place through other means including mass media, films and interactive computer programs.

Information and Technology Transfer

A significant portion of Saskatchewan's biodiversity occurs on private land. Education programs for landowners, municipalities, local communities and First Nations lands should be tailored to the needs of

these audiences. An example would be to provide technology transfer to farmers to encourage and support ecologically sustainable agricultural practices.

Similar concerns should also be addressed in vocational and technical training programs for government and non-government organizations. Ecological planning and management training programs tailored to the needs of policy makers and resource managers are required which assist in understanding the implications to biodiversity for policies and programs before they are implemented.

Objective 25:

Promote awareness of the value of biodiversity resources, conservation and sustainable use with the general public, stakeholders, Aboriginal partners and the agricultural community.

Areas for action could include:

- participating in national efforts;
- evaluation and monitoring of public understanding and knowledge of biodiversity conservation to assist in designing and targeting effective education programs;
- promotion of public awareness of biodiversity through ongoing state of biodiversity reporting;
- incorporation of the notions of biodiversity conservation into existing public information and education programs; and
- encouragement of projects that foster the participation by the pubic in regional and local land use planning and economic development.

Objective 26:

Facilitate training, information and technology transfer with industry, landowners and other land managers that support the conservation of biodiversity.

Areas of action could include:

- development and delivery of customized training strengthening relationships among educational institutions, government, Aboriginal peoples, the agricultural community, private property owners, non-government agencies and industry.

Objective 27:

Ensure government staff receive appropriate training in biodiversity awareness and implications for their area of responsibility.

Areas for action could include:

- providing improved training opportunities for all appropriate government staff (land use and resource managers) to increase their understanding of ecosystems and biodiversity conservation; and
- strengthening training programs in ecological management, sustainable use methodologies, ecosystem monitoring, data management, multi-disciplinary research and environmental assessment.

Goal 4: Incentives and Legislation

To maintain or develop incentives and legislation that support the conservation of biodiversity and the sustainable use of biological resources.

Often environmental conservation has been seen as a cost to society rather than an investment in the future and the benefits of biodiversity conservation are not understood. Goal four reflects the need for government decision making to reflect the value of biodiversity or "natural capital" in government policy and legislation.

Objective 28:

Ensure that current and proposed provincial programs, policy and legislation support biodiversity conservation.

Areas for actions could include:

- policy and legislation harmonization, with gaps between federal and provincial legislation and policies identified;
- reviewing current legislation and policy with respect to the goals of biodiversity conservation and revising the legislative framework to support conservation and the sustainable use of biodiversity; and
- develop an indicator of biodiversity integrity to complement existing Gross Domestic Product measurements.

Policy and Legislation

Government policies and legislation have influenced and will continue to influence biodiversity conservation. They can affect the corporate behavior in major resource sectors, including forestry and agriculture and in the extraction of non-renewable resources. Saskatchewan should review all existing and future government policies and legislation, from the perspective of their impact on biodiversity conservation and sustainable use of biological resources.

Policy and legislation which affects biodiversity is administered by various government departments and agencies. Government as a whole must therefore examine current legislation with respect to biodiversity conservation and take the necessary steps towards creating an improved legislative and policy framework. Existing legislation has conflicting goals or does not consider the negative impacts on ecosystems and the depletion of species and populations. It is imperative that economic, trade, conservation and sustainable use laws and policies are mutually supportive and reflect the value of natural capital.

Economic instruments should be developed to influence consumer behavior in ways that support biodiversity conservation. Consumer spending can be influenced by prices which reflect the environmental costs and benefits to the environment as well as how ecosystem health can benefit human health. Consumers are also often willing to choose products believed to be friendly to the environment. Economic instruments such as "green taxes" can also influence consumer behavior.

Presently there are few appropriate incentives that promote the conservation of biodiversity and protect our natural capital. Saskatchewan needs to enhance its capability to assign value to biodiversity and construct a natural resources account which complements standard national income accounts and allows for full cost accounting.

The government will also need to develop an implementation strategy to ensure the intent of the Action Plan is achieved. This mechanism may be through the establishment of a board or committee which would guide the continued transition from a departmental and sectoral approach of biodiversity conservation and resource management towards managing in an integrated manner and on an ecosystem basis.

Objective 29:

Adopt specific social and economic sustainable development incentives to promote the conservation of biodiversity and the sustainable use of biological resources.

Areas for actions could include:

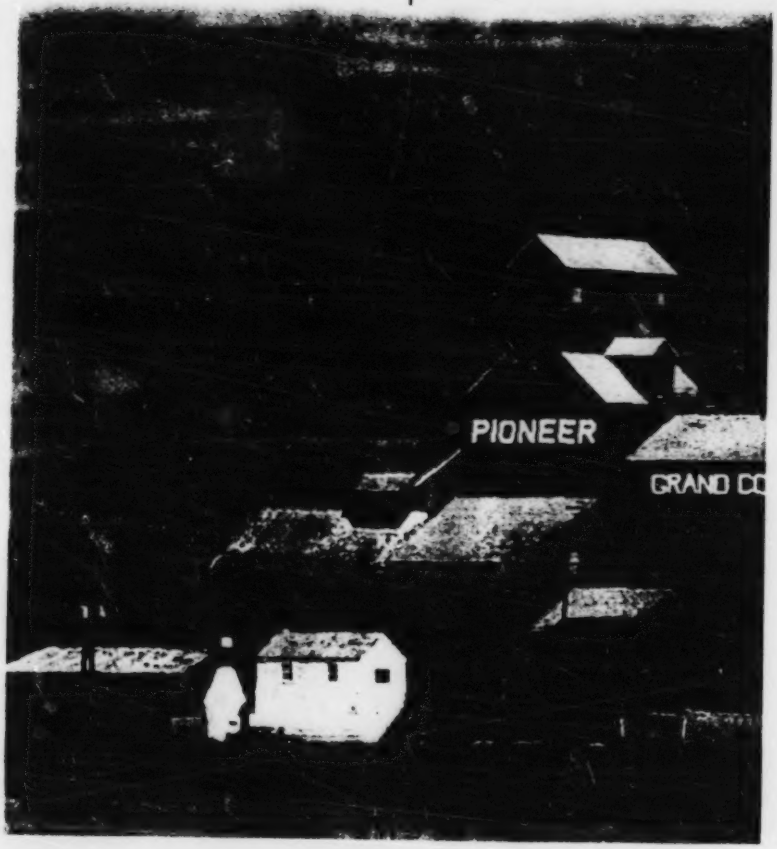
- identifying and expanding upon existing and potential economic instruments which encourage biodiversity conservation;
- identifying and working to mitigate economic policies which have negative impacts on biological resources and enhance those policies that have positive impacts on biological resources;
- ensuring the maintenance of biological diversity becomes one of the criteria for all government assistance programs; and
- identifying actions which will enable the introduction of new incentives and assess their feasibility and implementation.

Objective 30:

Develop an Action Plan Implementation Strategy to ensure continued evolution towards an ecosystem management approach across government.

Areas for action could include:

- establishing a board or committee to implement the Biodiversity Action Plan; and
- reporting to the Government of Saskatchewan and the public on the progress towards the goals outlined within the Action Plan.



Goal 5: Inter-jurisdictional Cooperation

To cooperate with other jurisdictions (international, national, provincial, municipal and First Nations) having policy responsibility and/or program interests to conserve biodiversity and use biological resources in a sustainable manner.

Objective 31:

Work with other jurisdictions and organizations to address trans-boundary issues that affect Saskatchewan's biodiversity.

Areas for actions could include:

- sharing information and knowledge with other jurisdictions;
- supporting inter-jurisdictional efforts to coordinate planning and management on an ecological basis (e.g. Prairie Conservation Action Plan, interprovincial parks, North American Waterfowl Management Plan); and
- encouraging and participating in the development and implementation of national and international efforts that support priority provincial programs and policies (e.g. inter-jurisdictional inventories; projects, plans and impact assessments on migratory species, aquatic ecosystems and airborne pollutants).

External Jurisdictions

Saskatchewan's interest in biodiversity with external jurisdictions relates to four areas: transborder ecological planning, primary resource protection (air, water, soil), migrating species and national and international programs of direct interest to Saskatchewan.

An ecosystem management approach recognizes the need for planning and management within the context of natural features, hence the need to look beyond political boundaries and cooperate with adjacent jurisdictions. Trans-border perspectives have been recognized by plans and programs for primary resources - principally air and water, and some wildlife species, but this needs to be extended to the broader ecosystem.

Over the course of a year, migrating species have diverse habitat requirements. Some species migrate continentally (across North America) and even hemispherically (North America and South America). Management for migrating species requires an international effort as has been demonstrated by the North American Waterfowl Management Plan.

Biodiversity conservation is a world-wide issue and support for provincial programs can originate nationally and internationally. Saskatchewan has primary responsibility for management of most of its natural resources, yet has a public funding base that is limited due to relatively low population and competing priorities. Saskatchewan needs to make an effort to maximize external support for provincial programs, primarily through representation to the federal government around national initiatives and international negotiations.

Internal Jurisdictions

Biodiversity conservation requires the support of all sectors of society. Saskatchewan recognizes that there are initiatives that require an effort at the regional and local community level. The province should support the efforts of urban and rural municipalities, First Nations and Métis that address priority issues.

International Development Assistance

Saskatchewan provides direct and indirect support to international development programs. Just as it assesses these programs for their economic or social impacts, they should also be assessed relative to their environmental impact - specifically related to biodiversity conservation in other nations. As well, Saskatchewan has technology and expertise that can be utilized internationally and on a commercial basis. Saskatchewan needs to be aware of both these opportunities and pursue those that are of significant benefit to the province.

Objective 32:

Represent provincial interests to the federal government on efforts related to:

- international negotiations arising from the Biodiversity Convention;
- soliciting federal support for provincial programs that meet the priorities of each; and
- the planning of research projects and programs by federal environmental agencies and departments that have implications for provincial responsibilities.

Objective 33:

Explore opportunities for community based biodiversity initiatives with municipal organizations (Saskatchewan Urban Municipality Association, Saskatchewan Association of Rural Municipalities, Provincial Association of Resort Communities of Saskatchewan and New North), First Nations and Métis.

Areas for actions could include:

- identifying the opportunities and determining what level government should be involved for any follow up action.

Objective 34:

Explore opportunities for the Saskatchewan government and residents to provide support to developing countries that would enhance their ability to conserve biodiversity.

Areas for actions could include:

- identifying the opportunities and determining what level of government should be involved for any follow up action.

Objective 35:

Identify and facilitate the transfer of Saskatchewan based, environmentally sound technologies that promote the conservation and sustainable use of biodiversity to other countries.

Objective 36:

Incorporate biodiversity conservation and the sustainable use of biological resources into the criteria for designing and evaluating development assistance projects supported by Saskatchewan.

Appendix 1: Glossary of Terms

Adaptive Management - an approach to making management decisions about complex and unpredictable systems, including ecosystems, which emphasizes conscious experimentation and continuous learning from the experience

Aquatic - pertaining to or living in or near water

Aboriginal peoples - includes the Indian (First Nations), Inuit and Métis peoples of Canada, as per section 35(2) of *The Canadian Constitution Act*, 1982

Aboriginal Traditional Ecological Knowledge - refers to the knowledge that Aboriginal peoples have accumulated over countless generations of intimate contact with all aspects of local ecosystems including plants, animals and other natural phenomena

Biodiversity (Biological Diversity) - includes all species of plants, animals and microorganisms and the ecosystems and ecological processes of which they are parts

Carbon Sequestration - carbon removed from the atmosphere and fixed in living or dead organic material

Ecosystem - an interdependent system consisting of all the living organisms in a given area, all the physical and chemical factors of their environment and the programs which link them

Ecosystem Integrity - a condition where the function and structure (including genetic, species and ecosystem diversity) of an ecosystem are unimpaired by human-induced stresses

Ecologically Sustainable Use - human use that ensures the capacity for ecosystems to renew themselves, ensuring continued availability for future generations

Local Knowledge - refers to the historical and practical knowledge accumulated by those who live close to the land and who make their livelihood directly from the land and related material resources such as farmers and ranchers

Natural Capital - natural stocks that yield flows of natural resources and services without which there can be no economic production (may be marketed or non-marketed)

Stewardship - the individual and corporate responsibility of one generation to maintain the natural inheritance that it has received, both for its benefit and for the benefit of future generations

Terrestrial - pertaining to or living on the land

Watershed - a discrete geographic area within which all water would drain to a single outlet

Wetlands - an area of low-lying land, submerged or inundated periodically by fresh or saline water

Appendix 2: Biodiversity Action Plan Interagency Steering Committee

Lin Gallagher
Environment and Resource Management
Phone: (306) 787-2327

Peter Gehl
Sask Water
Phone: (306) 694-3723

Wayne Gosselin
Agriculture and Food
Phone: (306) 787-6586

George Patterson
Energy and Mines
Phone: (306) 787-2560

Glen McMaster
Saskatchewan Wetland Conservation Corporation
Phone: (306) 787-8764

Paul Raths
Municipal Affairs, Culture and Housing
Phone: (306) 787-7672

Stan Saylor
SaskPower
Phone: (306) 566-2879

John Vandall
Environment and Resource Management
Phone: (306) 787-2862

Myrna Knight
Intergovernmental and Aboriginal Affairs
Phone: (306) 787-6251

Kerry Hanley
SaskEnergy Incorporated
Phone: (306) 777-9647

Giselle Marcotte
Intergovernmental and Aboriginal Affairs
Phone: (306) 787-0998

Cheryl Taylor
Highways and Transportation
Phone: (306) 787-3963

John Wolfenberg
Municipal Affairs, Culture and Housing
Phone: (306) 787-2710

Robin Woodward
Economic and Co-operative Development
Phone: (306) 787-1617

Appendix 3: References

Agriculture and Agri-Food Canada. 1997. *Biodiversity Initiatives -Canadian Agricultural Producers*. Ottawa. Environment Bureau and National Agriculture Environment Committee and Canadian Cattlemen's Association.

Carley M. and Christie I. 1994. *Managing Sustainable Development*. London, England. Earthscan.

Environment Canada. *1995.* *Canadian Biodiversity Strategy*. Canadian Museum of Nature.

Holmberg J. Editor. 1994. *Policies for a Small Planet*. London, England. International Institute for Environment and Development.

Klemm C. and Shine C. 1993. *Biological Diversity Conservation and the Law*. Gland, Switzerland. IUCN.

Meffe G., Carroll C. and Contributors. 1997. *Principles of Conservation Biology, Second Edition*. Sunderland, Massachusetts. Sinauer Associates, Inc.

Prairie Conservation Action Plan Committee. 1998. *Saskatchewan Prairie Conservation Action Plan*. Regina, Saskatchewan. Canadian Plains Research Centre.

President's Committee of Advisors on Science and Technology. 1998. *Teaming With Life: Investing in Science to Understand and Use America's Living Capital*. Executive Office of the President of the United States.

Saskatchewan Environment and Resource Management. 1994. *Saskatchewan's Environmental Agenda--Securing a Sustainable Future*. Regina

Saskatchewan Environment and Resource Management. 1995, 1997, 1999. *Saskatchewan's State of the Environment Report* . Regina.

Saskatchewan Research Council. 1999. *Threats to Biodiversity in Saskatchewan*. Saskatchewan Research Council Publication No. 11158 - IC99. Unpublished.

Taylor B., Hutchinson C., Pollack S. and Tapper R. 1994. *Environmental Management Handbook*. Great Britain. The Institute of Management Foundation.

Tourism Saskatchewan. 2000. *Tourism in Saskatchewan: Profile of a Growing Economic Sector*. Regina. Unpublished.

United Nations Environment Program. 1992. *United Nations Convention on Biological Diversity*.

Conserving Saskatchewan's Natural Environment: Framework for a Saskatchewan Biodiversity Action Plan

QUESTIONNAIRE

NAME: _____

ORGANIZATION REPRESENTED: _____

_____

_____

DATE: _____

MAILING ADDRESS: _____

_____

_____

EMAIL: _____ FAX / PHONE: _____

Do you agree/disagree with the proposed **Vision Statement** on page 9?

☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

Do you agree/disagree with the proposed principle statements on page 9?

☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

_____

Goal One: Conservation and Sustainable Use

Do you agree/disagree with Goal One on page 11? ☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

Establish and Manage Protected Areas: Objectives 1 and 2.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Action: _____

_____

_____

_____

_____

Sustainable Uses of Biological Resources: Objective 3.

Do you agree/disagree with objective and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

Suggestions for Actions:

_____

_____

_____

_____

_____

Biodiversity at Risk: Objectives 4, 5, 6 and 7

Do you agree/disagree with objectives and proposed areas for action? ❑ Disagree ❑ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Climate Change: Objectives 8 and 9.

Do you agree/disagree with objectives and proposed areas for action? ❑ Disagree ❑ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Pesticides and Pollution: Objective 10.

Do you agree/disagree with Objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

Suggestions for Actions:

Harmful Non-Native Organisms and Genetically Modified Organisms: Objectives 11 & 12.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

Suggestions for Actions:

Goal Two:Ecological Management

Do you agree/disagree with Goal Two on page 17?

☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

Information and Research: Objectives 13, 14, 15, 16, 17, 18 and 19.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Planning, Decision Making and Environmental Assessment: Objectives 20 and 21.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Monitoring: Objectives 22 and 23.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Goal Three: Education and Awareness

Do you agree/disagree with Goal Three on page 22? ☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

Formal Education: Objective 24.

Do you agree/disagree with objective and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions _____

_____

_____

_____

_____

General Public, Aboriginal Partners and Stakeholder Organizations: Objective 25.

Do you agree/disagree with objective and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Information and Technology Transfer: Objective 26 and 27.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

Suggestions for Actions _____

_____

_____

_____

_____

_____

Goal Four: Incentives and Legislation

Do you agree/disagree with Goal Four on page 24? ☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

Policy and Legislation: Objectives 28, 29 and 30.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

_____

Goal Five: Inter-jurisdictional and Cooperation

Do you agree/disagree with Goal Five on page 26? ☐ Disagree ☐ Agree

Comments:

_____

_____

_____

_____

_____

External Jurisdictions: Objectives 31 and 32.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions _____

_____

_____

_____

_____

Internal Jurisdictions: Objective 33.

Do you agree/disagree with objective and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

International Development Assistance: Objective 34, 35 and 36.

Do you agree/disagree with objectives and proposed areas for action? ☐ Disagree ☐ Agree

What are the potential implications to your organization?

_____

_____

_____

_____

_____

Suggestions for Actions: _____

_____

_____

_____

_____

Send Questionnaire to:

Saskatchewan Biodiversity Interagency Steering Committee
c/o Saskatchewan Environment and Resource Management
Fish and Wildlife Branch,
3211 Albert Street , Regina
Saskatchewan S4S 5W6